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EXAMINER

ZERVIGON, RUDY

ART UNIT

PAPER NUMBER

1763

MAIL DATE

DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

09/775,664

Applicant(s)

SHUFFLEBOTHAM ET AL.

Examiner

Rudy Zervigon

Art Unit

1763

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 14 June 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 72-79,81-91,93 and 94 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 72-79,81-91,93 and 94 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 05 February 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

1. Applicant's arguments, see pre-brief conference request form, filed May 16, 2007, with respect to the rejections of claims 72-79, 81-91, 93, and 94 under 35 USC 102 & 103 have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, new grounds of rejection is made in view of the below cited art.

Double Patenting

2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 72-79, 81-91, 93, and 94 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-16 of U.S. Patent No. US 6042687 A in view of Latz; Rudolf et al. (US 5,169,509 A). Although the conflicting claims are not identical, they are not patentably distinct from each other because. Claims 1-16 of U.S. Patent No. US 6042687 A do not claim an orifice orientated relative to the axis thereof to direct the process gas in an upward direction away from an exposed surface of the substrate.

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Latz teaches a wafer plasma processing apparatus (sole figure) including injector tubes (nozzle portion of 24/24a; Sole Figure) are provided on a first gas ring (24/24(a); Sole Figure) and at least one of the injector tubes (nozzle portion of 24/24a; Sole Figure) including an orifice orientated relative to the axis thereof to direct the process gas in an upward direction away from an exposed surface of the substrate (1,1',1'') when the substrate is supported on the substrate support (27).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace one of U.S. Patent No. US 6042687 A's injector tubes with Latz's injector tubes (nozzle portion of 24/24a; Sole Figure) provided on a first gas ring (24/24(a); Sole Figure).

Motivation to replace one of U.S. Patent No. US 6042687 A's injector tubes with Latz's injector tubes (nozzle portion of 24/24a; Sole Figure) provided on a first gas ring (24/24(a); Sole Figure) is for promoting "uniform and stable process" as taught by Latz (column 1; lines 60-65).

Claim Rejections - 35 USC § 102

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 72, 78, 79, 81-83 are rejected under 35 U.S.C. 102(e) as being anticipated by Li; Shijian et al. (US 6070551 A). Li teaches:

- i. An inductively coupled plasma CVD processing system (Figure 3; column 4; line 30-65) comprising: a plasma processing chamber (18; Figure 3; column 4; line 42); a planar dielectric window (portion 75 of dielectric 6; Figure 3; column 4; line 46) forming a top wall (75; Figure 3; column 5; lines 1-11) of the processing chamber (18; Figure 3;

column 4; line 42); a substantially planar electrically-conductive coil (9; Figure 3; column 4; line 30-65) extending across the planar dielectric window (portion 75 of dielectric 6; Figure 3; column 4; line 46) which inductively couples RF energy into the plasma processing chamber (18; Figure 3; column 4; line 42) through the planar dielectric window (portion 75 of dielectric 6; Figure 3; column 4; line 46) and energizes the process gas into a plasma state; a substrate support (14; Figure 3; column 4; line 30-65) mounted in the chamber (18; Figure 3; column 4; line 42) below the dielectric window (portion 75 of dielectric 6; Figure 3; column 4; line 46) and having a support surface (16; Figure 3; column 4; line 30-65) facing the dielectric window (portion 75 of dielectric 6; Figure 3; column 4; line 46), the support surface (16; Figure 3; column 4; line 30-65) adapted to support a substrate (20; Figure 3; column 4; line 30-65) within the processing chamber (18; Figure 3; column 4; line 42), the support surface (16; Figure 3; column 4; line 30-65) lying in a plane parallel to the planar dielectric window (portion 75 of dielectric 6; Figure 3; column 4; line 46); and a plurality of injector tubes (34,34a; Figure 3; column 4; line 47-58) adapted to introduce process gas into the processing chamber (18; Figure 3; column 4; line 42), all of the injector tubes (34,34a; Figure 3; column 4; line 47-58) being spaced outwardly from the periphery of the substrate (20; Figure 3; column 4; line 30-65) when the substrate (20; Figure 3; column 4; line 30-65) is supported on the substrate support (14; Figure 3; column 4; line 30-65), as claimed by claim 72. Applicant's amended claim limitation "all of the injector tubes being spaced outwardly from the periphery of the substrate when the substrate is supported on the substrate support" is a claim requirement of intended use in the pending apparatus claims. It is noted that an

infinite number of substrate geometries and/or placements (non-structural requirements) within the reactor can and would meet the claim requirement. As a result, the prior art structure is capable of performing the intended use. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP 2111.02).

- ii. The system (Figure 3; column 4; line 30-65) of claim 72, wherein the plurality of gas flows from the injector tubes (34,34a; Figure 3; column 4; line 47-58) overlap each other in a plane parallel to an exposed surface of the substrate (20; Figure 3; column 4; line 30-65) when the substrate (20; Figure 3; column 4; line 30-65) is supported on the substrate support (14; Figure 3; column 4; line 30-65), as claimed by claim 78. When the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).
- iii. The system (Figure 3; column 4; line 30-65) of claim 72, wherein each of the injector tubes (34,34a; Figure 3; column 4; line 47-58) includes an exit orifice (38; Figure 3; column 4; line 47-58) , and each of the orifices (38; Figure 3; column 4; line 47-58) is spaced the same distance outwardly from the periphery of the substrate (20; Figure 3;

column 4; line 30-65) when the substrate (20; Figure 3; column 4; line 30-65) is supported on the substrate support (14; Figure 3; column 4; line 30-65), as claimed by claim 79. Applicant's claim requirements of "and each of the orifices is spaced the same distance outwardly from the periphery of the substrate when the substrate is supported on the substrate support" is a claim requirement of intended use in the pending apparatus claims. It is noted that an infinite number of substrate geometries and/or placements (non-structural requirements) within the reactor can and would meet the claim requirement. As a result, the prior art structure is capable of performing the intended use. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP 2111.02).

- iv. The system (Figure 3; column 4; line 30-65) is claim 72, wherein all of the injector tubes (34, 34a; Figure 3; column 4; line 47-58) have the same length such that exit orifices (38; Figure 3; column 4; line 47-58) of the injector tubes (34, 34a; Figure 3; column 4; line 47-58) are spaced the same distance outwardly from the periphery of the substrate (20; Figure 3; column 4; line 30-65) when the substrate (20; Figure 3; column 4; line 30-65) is supported on the substrate support (14; Figure 3; column 4; line 30-65), as claimed by claim 81. Applicant's claim requirements of "such that exit orifices of the injector tubes

are spaced the same distance outwardly from the periphery of the substrate when the substrate is supported on the substrate support” is a claim requirement of intended use in the pending apparatus claims. It is noted that an infinite number of substrate geometries and/or placements (non-structural requirements) within the reactor can and would meet the claim requirement. As a result, the prior art structure is capable of performing the intended use. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

- v. The system (Figure 3; column 4; line 30-65) of claim 72, wherein some of the injector tubes (34,34a; Figure 3; column 4; line 47-58) have different lengths such that exit orifices (38; Figure 3; column 4; line 47-58) of some of the injector tubes (34,34a; Figure 3; column 4; line 47-58) are spaced a different distance outwardly from the periphery of the substrate (20; Figure 3; column 4; line 30-65) when the substrate (20; Figure 3; column 4; line 30-65) is supported on the substrate support (14; Figure 3; column 4; line 30-65), as claimed by claim 82
- vi. The system (Figure 3; column 4; line 30-65) of claim 72, wherein all of the injector tubes (34,34a; Figure 3; column 4; line 47-58) includes an exit orifice (38; Figure 3; column 4;

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line 47-58) spaced outwardly from the periphery of the substrate support (14; Figure 3; column 4; line 30-65), as claimed by claim 83

Claim Rejections - 35 USC § 103

3. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

4. Claims 73-77 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li; Shijian et al. (US 6070551 A) in view of Latz; Rudolf et al. (US 5,169,509 A). Li is discussed above. Li is discussed above.

Li further teaches:

- i. The system (Figure 3; column 4; line 30-65) of claim 76, including a second gas ring (36; Figure 3; column 4; line 47-58) disposed above or below the first gas ring (36a; Figure 3; column 4; line 47-58) in the plasma processing chamber (18; Figure 3; column 4; line 42), as claimed by claim 77

Li does not teach:

- ii. The system (Figure 3; column 4; line 30-65) of claim 72, wherein the injector tubes (34,34a; Figure 3; column 4; line 47-58) are provided on a first gas ring (36a; Figure 3; column 4; line 47-58), at least some of the injector tubes (34,34a; Figure 3; column 4; line 47-58) include an orifice orientated relative to the axis thereof to direct the process gas in an upward direction away from the substrate (20; Figure 3; column 4; line 30-65) when the substrate (20; Figure 3; column 4; line 30-65) is supported on the substrate support (14; Figure 3; column 4; line 30-65); and at least some of the injector tubes are orientated in the plasma processing chamber (18; Figure 3; column 4; line 42) to direct

the process gas along the axes thereof that intersect an exposed surface of the substrate (20; Figure 3; column 4; line 30-65) at an acute angle when the substrate (20; Figure 3; column 4; line 30-65) is supported on the substrate support (14; Figure 3; column 4; line 30-65) - claim 73

iii. The system (Figure 3; column 4; line 30-65) of claim 72, wherein: the injector tubes (34,34a; Figure 3; column 4; line 47-58) are provided on a first gas ring (36a; Figure 3; column 4; line 47-58); all of the injector tubes (34,34a; Figure 3; column 4; line 47-58) are orientated in the plasma processing chamber (18; Figure 3; column 4; line 42) to direct the process gas along axes thereof that intersect an exposed surface of the substrate (20; Figure 3; column 4; line 30-65) at an acute angle when the substrate (20; Figure 3; column 4; line 30-65) is supported on the substrate support (14; Figure 3; column 4; line 30-65) - claim 74

iv. An inductively coupled plasma CVD processing system (Figure 3; column 4; line 30-65) comprising: a. plasma processing chamber (18; Figure 3; column 4; line 42); a planar dielectric window (portion 75 of dielectric 6; Figure 3; column 4; line 46) forming a top wall (75; Figure 3; column 5; lines 1-11) of the processing chamber (18; Figure 3; column 4; line 42); a substantially planar electrically-conductive coil (9; Figure 3; column 4; line 30-65) extending across the planar dielectric window (portion 75 of dielectric 6; Figure 3; column 4; line 46) which inductively couples RF energy into the plasma processing chamber (18; Figure 3; column 4; line 42) through the planar dielectric window (portion 75 of dielectric 6; Figure 3; column 4; line 46) and energizes the process gas into a plasma state; a substrate support (14; Figure 3; column 4; line 30-65) mounted

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in the chamber (18; Figure 3; column 4; line 42) below the dielectric window (portion 75 of dielectric 6; Figure 3; column 4; line 46) and having a support facing the dielectric window (portion 75 of dielectric 6; Figure 3; column 4; line 46), the support surface (16; Figure 3; column 4; line 30-65) adapted to support a substrate (20; Figure 3; column 4; line 30-65) within the processing chamber (18; Figure 3; column 4; line 42), the support surface (16; Figure 3; column 4; line 30-65) lying in a plane parallel to the planar dielectric window (portion 75 of dielectric 6; Figure 3; column 4; line 46); and a plurality of injector tubes (34,34a; Figure 3; column 4; line 47-58) adapted to introduce process gas into the processing chamber (18; Figure 3; column 4; line 42), all of the injector tubes (34,34a; Figure 3; column 4; line 47-58) being spaced outwardly from the periphery of the substrate (20; Figure 3; column 4; line 30-65) when the substrate (20; Figure 3; column 4; line 30-65) is supported on the substrate support (14; Figure 3; column 4; line 30-65) and at least one of the injector tubes (34,34a; Figure 3; column 4; line 47-58) including an orifice (38; Figure 3; column 4; line 47-58) orientated relative to the axis thereof to direct the process gas in an upward direction away from an exposed surface of the substrate when the substrate is supported on the substrate support, as claimed by claim 75. Applicant's amended claim limitation "all of the injector tubes being spaced outwardly from the periphery of the substrate when the substrate is supported on the substrate support" is a claim requirement of intended use in the pending apparatus claims. It is noted that an infinite number of substrate geometries and/or placements (non-structural requirements) within the reactor can and would meet the claim requirement. As a result, the prior art structure is capable of performing the intended use. Further, it has

been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963); MPEP 2111.02).

- v. The system (Figure 3; column 4; line 30-65) of claim 72, wherein the injector tubes (34,34a; Figure 3; column 4; line 47-58) are detachably connected (“fluidly coupled”; column 4; lines 47-58) to a first gas ring (36a; Figure 3; column 4; line 47-58) made of aluminum which includes outlets (38; Figure 3; column 4; line 47-58) adapted to supply process gas into the plasma processing chamber (18; Figure 3; column 4; line 42), as claimed by claim 76

Latz teaches a wafer plasma processing apparatus (sole figure) including injector tubes (nozzle portion of 24/24a; Sole Figure) are provided on a first gas ring (24/24(a); Sole Figure) and at least one of the injector tubes (nozzle portion of 24/24a; Sole Figure) including an orifice orientated relative to the axis thereof to direct the process gas in an upward direction away from an exposed surface of the substrate (1,1',1'') when the substrate is supported on the substrate support (27).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace one of Li's injector tubes (34,34a; Figure 3; column 4; line 47-58) with Latz's injector tubes (nozzle portion of 24/24a; Sole Figure) provided on a first gas ring (24/24(a); Sole Figure).

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Motivation to replace one of Li's injector tubes (34,34a; Figure 3; column 4; line 47-58) with Latz's injector tubes (nozzle portion of 24/24a; Sole Figure) provided on a first gas ring (24/24(a); Sole Figure) is for promoting "uniform and stable process" as taught by Latz (column 1; lines 60-65).

5. Claim 84 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li; Michael D. et al. (US 6070551 A) in view of Chen, Aihua (USPat. 5,691,876). Li is discussed above. Li does not teach the substrate support includes means for maintaining the substrate at a desired temperature – claim 84.

Chen teaches:

- i. the substrate (not shown; Figure 1; column 8, lines 40-55) support (100; Figure 1) including means for maintaining the substrate (not shown; Figure 1; column 8, lines 40-55) at a desired temperature – claim 84

Applicant's means for maintaining the substrate at a desired temperature is supported by the specification:

" [0027] In order to prevent damage to metal lines or the pre-existing films and structures on the substrate and to ensure accurate and precise process control, a heated mechanical or preferably an electrostatic chuck (ESC) is employed to hold the substrate. The ESC is preferably bipolar or monopolar. Preferably, the electrode is maintained at a temperature ranging from about 50°C. to 350°C, in order to maintain the temperature of the wafer to about 325°C to 375°C.

"

Consequently, Chen teaches equivalent means (column 6, lines 35-54; 5-18)

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- i. The system (Figure 1) of claim 72, wherein the substrate (not shown; Figure 1; column 8, lines 40-55) support (100; Figure 1) includes means (see above) for maintaining the substrate (not shown; Figure 1; column 8, lines 40-55) at a desired temperature when the substrate (not shown; Figure 1; column 8, lines 40-55) is supported on the substrate (not shown; Figure 1; column 8, lines 40-55) support (100; Figure 1), as claimed by claim 84

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Li's support (14; Figure 3; column 4; line 30-65) with Chen's temperature controlled support (100; Figure 1).

Motivation to replace Li's support (14; Figure 3; column 4; line 30-65) with Chen's temperature controlled support (100; Figure 1) is for conducting high temperature processing of substrates as taught by Chen (column 1; lines 1-18; column 2; lines 18-24).

6. Claims 85-91, 93 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li; Michael D. et al. (US 6,200,412 B1) in view of Chen, Aihua (USPat. 5,691,876) and Latz; Rudolf et al. (US 5,169,509 A). Li and Chen are discussed above. Li further teaches injector tubes (34,34a; Figure 3; column 4; line 47-58) are detachably connected ("fluidly coupled"; column 4; lines 47-58) to a first gas ring (36a; Figure 3; column 4; line 47-58) - claim 88. A second gas ring (36; Figure 3; column 4; line 47-58) disposed above or below the first gas ring (36a; Figure 3; column 4; line 47-58) - claim 88

Li further teaches:

- i. The system (Figure 3; column 4; line 30-65) of Claim 85, wherein a plurality of gas flows from the injector tubes (34,34a; Figure 3; column 4; line 47-58) overlap each other in a plane parallel to an exposed surface of the substrate (20; Figure 3; column 4; line 30-65)

when the substrate (20; Figure 3; column 4; line 30-65) is supported on the substrate support (14; Figure 3; column 4; line 30-65), as claimed by claim 91. When the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).

Li does not teach:

- ii. An inductively coupled plasma CVD processing system (Figure 3; column 4; line 30-65), comprising: a plasma processing chamber (18; Figure 3; column 4; line 42); a planar dielectric window (portion 75 of dielectric 6; Figure 3; column 4; line 46) forming a top wall (75; Figure 3; column 5; lines 1-11) of the plasma processing chamber (18; Figure 3; column 4; line 42); a substantially planar electrically-conductive coil (9; Figure 3; column 4; line 30-65) extending across the planar dielectric window (portion 75 of dielectric 6; Figure 3; column 4; line 46) which inductively couples RF energy into the plasma processing chamber (18; Figure 3; column 4; line 42) through the planar dielectric window (portion 75 of dielectric 6; Figure 3; column 4; line 46) and energizes the process gas into a plasma state; a substrate support (14; Figure 3; column 4; line 30-65) mounted in the chamber (18; Figure 3; column 4; line 42) below the dielectric window (portion 75 of dielectric 6; Figure 3; column 4; line 46) and having a support surface (16; Figure 3; column 4; line 30-65) facing the dielectric window (portion 75 of dielectric 6; Figure 3; column 4; line 46), the support surface (16; Figure 3; column 4; line 30-65) adapted to support a substrate (20; Figure 3; column 4; line 30-65) within the processing chamber (18; Figure 3; column 4; line 42), the support surface (16; Figure 3; column 4; line 30-65)

lying in a plane parallel to the planar dielectric window (portion 75 of dielectric 6; Figure 3; column 4; line 46), the substrate support including means for maintaining the substrate at a desired temperature; and a plurality of injector tubes (34,34a; Figure 3; column 4; line 47-58) each including an orifice (38; Figure 3; column 4; line 47-58) oriented relative to the axis thereof to direct the process gas in an upward direction away from the substrate (20; Figure 3; column 4; line 30-65) when the substrate (20; Figure 3; column 4; line 30-65) is supported on the substrate support (14; Figure 3; column 4; line 30-65); and/or (ii) a plurality of injector tubes (34,34a; Figure 3; column 4; line 47-58) each oriented in the plasma processing chamber (18; Figure 3; column 4; line 42) to direct the process gas along an axis thereof that intersects an exposed surface of the substrate (20; Figure 3; column 4; line 30-65) at an acute angle when the substrate (20; Figure 3; column 4; line 30-65) is supported on the substrate support (14; Figure 3; column 4; line 30-65) - claim 85. Applicant's amended claim limitation "such that the substrate lies in a plane parallel to the planar dielectric window", amounting to how a treated article is orientated, is a claim requirement of intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter , 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re

Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

- iii. The system (Figure 3; column 4; line 30-65) of Claim 85, wherein the means for maintaining the substrate (20; Figure 3; column 4; line 30-65) at a desired temperature includes an electrostatic chuck and is adapted to maintain the substrate (20; Figure 3; column 4; line 30-65) at a temperature ranging from about 325°C to 375°C when the substrate (20; Figure 3; column 4; line 30-65) is supported on the substrate support (14; Figure 3; column 4; line 30-65), as claimed by claim 86
- iv. The system (Figure 3; column 4; line 30-65) of Claim 85, wherein the substrate support (14; Figure 3; column 4; line 30-65) includes a heat transfer gas source which is adapted to supply a heat transfer gas to control the temperature of the substrate (20; Figure 3; column 4; line 30-65) to a temperature of about 100°C to 400°C, as claimed by claim 87
- v. The system (Figure 3; column 4; line 30-65) of Claim 85, wherein the injector tubes (34, 34a; Figure 3; column 4; line 47-58) are oriented in the plasma processing chamber (18; Figure 3; column 4; line 42) to direct the process gas along axes thereof that intersect the exposed surface of the substrate (20; Figure 3; column 4; line 30-65) at an acute angle when the substrate (20; Figure 3; column 4; line 30-65) is supported on the substrate support (14; Figure 3; column 4; line 30-65), as claimed by claim 89
- vi. The system (Figure 3; column 4; line 30-65) of Claim 85, wherein the injector tubes (34, 34a; Figure 3; column 4; line 47-58) include an orifice (38; Figure 3; column 4; line 47-58) oriented relative to the axis thereof to direct the process gas in an upward direction away from an exposed surface of the substrate (20; Figure 3; column 4; line 30-

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65)when the substrate (20; Figure 3; column 4; line 30-65)is supported on the substrate support (14; Figure 3; column 4; line 30-65), as claimed by claim 90

- vii. The system (Figure 3; column 4; line 30-65) of Claim 85, wherein each of the injector tubes (34,34a; Figure 3; column 4; line 47-58) has the same length, as claimed by claim 93

Chen teaches:

- i. the substrate (not shown; Figure 1; column 8, lines 40-55) support (100; Figure 1) including means for maintaining the substrate (not shown; Figure 1; column 8, lines 40-55) at a desired temperature – claim 85

Applicant's means for maintaining the substrate at a desired temperature is supported by the specification:

“ [0027] In order to prevent damage to metal lines or the pre-existing films and structures on the substrate and to ensure accurate and precise process control, a heated mechanical or preferably an electrostatic chuck (ESC) is employed to hold the substrate. The ESC is preferably bipolar or monopolar. Preferably, the electrode is maintained at a temperature ranging from about 50°C. to 350°C, in order to maintain the temperature of the wafer to about 325°C to 375°C.

“

Consequently, Chen teaches equivalent means (column 6, lines 35-54; 5-18)

- ii. The system (Figure 1) of Claim 85, wherein the means for maintaining the substrate (not shown; Figure 1; column 8, lines 40-55) at a desired temperature includes an electrostatic chuck and is adapted to maintain the substrate (not shown; Figure 1; column 8, lines 40-55) at a temperature ranging from about 325°C to 375°C (claim 9) when the substrate

(not shown; Figure 1; column 8, lines 40-55) is supported on the substrate (not shown; Figure 1; column 8, lines 40-55) support (100; Figure 1), as claimed by claim 86

It would have been obvious to one of ordinary skill in the art at the time the invention was made to replace Li's support (32c; Figure 1) with Chen's temperature controlled support (100; Figure 1), and to replace Li's injector tubes (34,34a; Figure 3; column 4; line 47-58) with Latz's injector tubes (nozzle portion of 24/24a; Sole Figure) provided on a first gas ring (24/24(a); Sole Figure), further, to optimize the dimension and/or position of Li's injector tubes.

Motivation to replace Li's support (32c; Figure 1) with Chen's temperature controlled support (100; Figure 1) is for conducting high temperature processing of substrates as taught by Chen (column 1; lines 1-18; column 2; lines 18-24), and motivation to replace Li's injector tubes (34,34a; Figure 3; column 4; line 47-58) with Latz's injector tubes (nozzle portion of 24/24a; Sole Figure) provided on a first gas ring (24/24(a); Sole Figure), further, to optimize the dimension and/or position of Li's injector tubes is for promoting "uniform and stable process" as taught by Latz (column 1; lines 60-65). Further, it is well established that changes in apparatus dimensions are within the level of ordinary skill in the art. (Gardner v. TEC Systems, Inc. , 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied , 469 U.S. 830, 225 USPQ 232 (1984); In re Rose , 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); See MPEP 2144.04).

It is well established that the rearrangement of parts is considered obvious to those of ordinary skill (In re Japikse , 181 F.2d 1019, 86 USPQ 70 (CCPA 1950); In re Kuhle , 526 F.2d 553, 188 USPQ 7 (CCPA 1975); Ex parte Chicago Rawhide Manufacturing Co. , 223 USPQ 351, 353 (Bd. Pat. App. & Inter. 1984).; MPEP 2144.04)

It is well established that the duplication of parts is obvious (In re Harza , 274 F.2d 669, 124 USPQ 378 (CCPA 1960) MPEP 2144.04).

7. Claim 94 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li; Shijian et al. (US 6070551 A) in view of Ishii; Nobuo et al. (US 5571366 A). Li is discussed above. Li does not teach the system of Claim 72, wherein the planar electrically-conductive coil is a single conductive element formed into a planar spiral or a series of concentric rings. Ishii teaches an inductively coupled plasma reactor including a planar electrically-conductive coil (6; Figure 8) is a single conductive element formed into a planar spiral.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to add Ishii's planar electrically-conductive coil (6; Figure 8) to Li's apparatus.

Motivation to add Ishii's planar electrically-conductive coil (6; Figure 8) to Li's apparatus is for higher precision plasma processing as taught by Ishii (column 10; lines 50-52).

8. Claims 72-79, 81-91, 93, and 94 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Demos; Alex et al. (US 6626185 B2)

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

9. Claims 72-79, 81-91, 93, and 94 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by McMillin; Brian et al. (US 6270862 B1)

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

10. Claims 72-79, 81-91, 93, and 94 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by McMillin; Brian et al. (US 6013155 A)

The applied reference has a common assignee with the instant application. Based upon the earlier effective U.S. filing date of the reference, it constitutes prior art under 35 U.S.C. 102(e). This rejection under 35 U.S.C. 102(e) might be overcome either by a showing under 37 CFR 1.132 that any invention disclosed but not claimed in the reference was derived from the inventor of this application and is thus not the invention "by another," or by an appropriate showing under 37 CFR 1.131.

Response to Arguments

11. Applicant's arguments with respect to claims 72-79, 81-91, 93, and 94 have been considered but are moot in view of the new grounds of rejection.

Conclusion

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272-

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1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official fax phone number for the 1763 art unit is (571) 273-8300. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Parviz Hassanzadeh, at (571) 272-1435.

Parviz Hassanzadeh
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